

General

Title

Diagnostic imaging: percentage of final reports for procedures using fluoroscopy that include radiation exposure indices, or exposure time and number of fluorographic images (if radiation exposure indices are not available).

Source(s)

American College of Radiology (ACR), American Medical Association-convened Physician Consortium for Performance Improvement® (PCPIA®), National Committee for Quality Assurance (NCQA). Diagnostic imaging performance measurement set. Reston (VA): American College of Radiology (ACR); 2015 Feb. 58 p. [89 references]

Measure Domain

Primary Measure Domain

Clinical Quality Measures: Process

Secondary Measure Domain

Does not apply to this measure

Brief Abstract

Description

This measure is used to assess the percentage of final reports for procedures using fluoroscopy that include radiation exposure indices, or exposure time and number of fluorographic images (if radiation exposure indices are not available).

Rationale

Increasing physician awareness of patient exposure to radiation is an important step towards reducing the potentially harmful effects of radiation as a result of imaging studies. One study by Darling et al. (2011) found a significant correlation between documentation of fluoroscopy time by the radiologist in the dictated radiology report and reduced overall fluoroscopy time. Additional studies demonstrate that providing physicians with feedback regarding their fluoroscopy time leads to a reduction in average

fluoroscopy times (Ngo et al., 2011; Ritter et al., 2013).

The following evidence statements are quoted verbatim from the referenced clinical guidelines and other references:

All available radiation dose data should be recorded in the patient's medical record. If cumulative air kerma (Ka,r) or air kerma-area-product (PKA) data are not available, the fluoroscopic exposure time and the number of acquired images (radiography, cine, or digital subtraction angiography) should be recorded in the patient's medical record. (American College of Radiology [ACR], 2013).

For the present, and for the purpose of this guideline, adequate recording of dose metrics is defined as documentation in the patient record of at least one of the following for all interventional procedures requiring fluoroscopy (in descending order of desirability): skin dose mapping, peak skin dose (PSD), Ka,r, PKA, and fluoroscopic time/number of fluorographic images. Note, however, that this is adequate recording; this document recommends recording of all available dose metrics (Miller et al., 2012).

ACR should now encourage practices to record actual fluoroscopy time for all fluoroscopic procedures. The fluoroscopy time for various procedures (e.g., upper gastrointestinal, pediatric voiding cystourethrography, diagnostic angiography) should then be compared with benchmark figures...More complete patient radiation dose data should be recorded for all high-dose interventional procedures, such as embolizations, transjugular intrahepatic portosystemic shunts, and arterial angioplasty or stent placement anywhere in the abdomen and pelvis (Amis et al., 2007).

Measure & record patient radiation dose:

- Record fluoroscopy time

- Record available measures – dose area product (DAP), cumulative dose, skin dose (National Cancer Institute [NCI], 2005).

Evidence for Rationale

American College of Radiology (ACR), American Association of Physicists in Medicine (AAPM). ACR-AAPM technical standard for management of the use of radiation in fluoroscopic procedures. Reston (VA): American College of Radiology (ACR); 2013. 13 p.

American College of Radiology (ACR), American Medical Association-convened Physician Consortium for Performance Improvement® (PCPIA®), National Committee for Quality Assurance (NCQA). Diagnostic imaging performance measurement set. Reston (VA): American College of Radiology (ACR); 2015 Feb. 58 p. [89 references]

Amis ES Jr, Butler PF, Applegate KE, Birnbaum SB, Brateman LF, Hevezi JM, Mettler FA, Morin RL, Pentecost MJ, Smith GG, Strauss KJ, Zeman RK, American College of Radiology. American College of Radiology white paper on radiation dose in medicine. J Am Coll Radiol. 2007 May;4(5):272-84. [PubMed](#)

Darling S, Sammer M, Chapman T, Parisi MT. Physician documentation of fluoroscopy time in voiding cystourethrography reports correlates with lower fluoroscopy times: a surrogate marker of patient radiation exposure. AJR Am J Roentgenol. 2011 Jun;196(6):W777-80. [PubMed](#)

Miller DL, Balter S, Dixon RG, Nikolic B, Bartal G, Cardella JF, Dauer LT, Stecker MS, Society of Interventional Radiology Standards of Practice Committee. Quality improvement guidelines for recording patient radiation dose in the medical record for fluoroscopically guided procedures. J Vasc Interv Radiol. 2012 Jan;23(1):11-8. [PubMed](#)

National Cancer Institute (NCI). Interventional fluoroscopy: reducing radiation risks for patients and staff. [internet]. Bethesda (MD): National Cancer Institute (NCI); 2005.

Ngo TC, Macleod LC, Rosenstein DI, Reese JH, Shinghal R. Tracking intraoperative fluoroscopy utilization reduces radiation exposure during ureteroscopy. *J Endourol*. 2011 May;25(5):763-7. [PubMed](#)

Ritter M, Siegel F, Krombach P, Martinschek A, Weiss C, H  cker A, Pelzer AE. Influence of surgeon's experience on fluoroscopy time during endourological interventions. *World J Urol*. 2013 Feb;31(1):183-7. [PubMed](#)

Primary Health Components

Fluoroscopy procedures; radiation exposure indices; exposure time; fluorographic images

Denominator Description

All final reports for procedures using fluoroscopy (see the related "Denominator Inclusions/Exclusions" field)

Numerator Description

Final reports for procedures using fluoroscopy that include radiation exposure indices, or exposure time and number of fluorographic images (if radiation exposure indices are not available) (see the related "Numerator Inclusions/Exclusions" field)

Evidence Supporting the Measure

Type of Evidence Supporting the Criterion of Quality for the Measure

A clinical practice guideline or other peer-reviewed synthesis of the clinical research evidence

A formal consensus procedure, involving experts in relevant clinical, methodological, public health and organizational sciences

One or more research studies published in a National Library of Medicine (NLM) indexed, peer-reviewed journal

Additional Information Supporting Need for the Measure

Importance of Topic

As imaging technology continues to advance, the United States healthcare system has seen an increase in both the type and frequency of imaging studies being performed. The increase in utilization of imaging studies is accompanied by a corresponding increase in cost and exposure to radiation for both patients and healthcare professionals.

From 1980 to 2006, the number of radiologic procedures performed in the United States showed a ten-fold increase while the annual per-capita effective dose from radiologic and nuclear medicine procedures increased by 600% (Mettler et al., 2009).

From 1996 to 2010, the number of computerized tomographic (CT) examinations tripled, while the number of ultrasounds nearly doubled (Smith-Bindman et al., 2012).

From 1996 to 2010, advanced diagnostic imaging (i.e., CT, magnetic resonance imaging [MRI], nuclear medicine, and ultrasound) accounted for approximately 35% of all imaging studies (Smith-Bindman et al., 2012).

From 1980 to 2006, the proportion of radiation exposure that is attributable to medical sources

increased from 17% to 53% (Mettler et al., 2009).

In 2006, while CT scans only accounted for approximately 17% of all radiologic procedures performed in the United States, they accounted for over 65% of the total effective radiation dose from radiologic procedures (Mettler et al., 2009).

In 2006, the estimated per-capita effective radiation dose for radiologic procedures in the United States was nearly 20% higher than the average for other well-developed countries (Mettler et al., 2009).

Diagnostic imaging was prioritized as a topic area for measure development due to a high level of utilization, rising costs, and the need for measures to help promote appropriate use of imaging and improve outcomes.

Opportunity for Improvement

Studies have demonstrated a general lack of awareness among physicians and radiologists of the relative doses of various imaging studies (Lee et al., 2004; Puri et al., 2012; Thomas et al., 2006). In one study by Lee et al. (2004), only 22% of emergency department physicians and 13% of radiologists were able to give an accurate estimate of the radiation dose of a CT scan as compared to a chest radiograph. Additionally, studies (Ritter et al., 2013; Jorgensen et al., 2010; Kim et al., 2010; Kim et al., 2011; Uradomo, Lustberg, & Darwin, 2006) have shown that fluoroscopy time for a given imaging study varies from physician to physician based on a variety of factors including gender and level of experience.

Evidence for Additional Information Supporting Need for the Measure

American College of Radiology (ACR), American Medical Association-convened Physician Consortium for Performance Improvement® (PCPIA®), National Committee for Quality Assurance (NCQA). Diagnostic imaging performance measurement set. Reston (VA): American College of Radiology (ACR); 2015 Feb. 58 p. [89 references]

Jorgensen JE, Rubenstein JH, Goodsitt MM, Elta GH. Radiation doses to ERCP patients are significantly lower with experienced endoscopists. *Gastrointest Endosc.* 2010 Jul;72(1):58-65. [PubMed](#)

Kim E, McLoughlin M, Lam EC, Amar J, Byrne M, Telford J, Enns R. Prospective analysis of fluoroscopy duration during ERCP: critical determinants. *Gastrointest Endosc.* 2010 Jul;72(1):50-7. [PubMed](#)

Kim E, McLoughlin M, Lam EC, Amar J, Byrne M, Telford J, Enns R. Retrospective analysis of radiation exposure during endoscopic retrograde cholangiopancreatography: critical determinants. *Can J Gastroenterol.* 2011 Oct;25(10):555-9. [PubMed](#)

Lee CI, Haims AH, Monico EP, Brink JA, Forman HP. Diagnostic CT scans: assessment of patient, physician, and radiologist awareness of radiation dose and possible risks. *Radiology.* 2004 May;231(2):393-8. [PubMed](#)

Mettler FA, Bhargavan M, Faulkner K, Gilley DB, Gray JE, Ibbott GS, Lipoti JA, Mahesh M, McCrohan JL, Stabin MG, Thomadsen BR, Yoshizumi TT. Radiologic and nuclear medicine studies in the United States and worldwide: frequency, radiation dose, and comparison with other radiation sources--1950-2007. *Radiology.* 2009 Nov;253(2):520-31. [PubMed](#)

Puri S, Hu R, Quazi RR, Voci S, Veazie P, Block R. Physicians' and midlevel providers' awareness of lifetime radiation-attributable cancer risk associated with commonly performed CT studies: relationship to practice behavior. *Am J Roentgenol.* 2012 Dec;199(6):1328-36. [PubMed](#)

Ritter M, Siegel F, Krombach P, Martinschek A, Weiss C, H  cker A, Pelzer AE. Influence of surgeon's experience on fluoroscopy time during endourological interventions. *World J Urol.* 2013 Feb;31(1):183-7. [PubMed](#)

Smith-Bindman R, Miglioretti DL, Johnson E, Lee C, Feigelson HS, Flynn M, Greenlee RT, Kruger RL, Hornbrook MC, Roblin D, Solberg LI, Vanneman N, Weinmann S, Williams AE. Use of diagnostic imaging studies and associated radiation exposure for patients enrolled in large integrated health care systems, 1996-2010. JAMA. 2012 Jun 13;307(22):2400-9. [PubMed](#)

Thomas KE, Parnell-Parmley JE, Haidar S, Moineddin R, Charkot E, Ben-David G, Krajewski C. Assessment of radiation dose awareness among pediatricians. Pediatr Radiol. 2006 Aug;36(8):823-32. [PubMed](#)

Uradomo LT, Lustberg ME, Darwin PE. Effect of physician training on fluoroscopy time during ERCP. Dig Dis Sci. 2006 May;51(5):909-14.

Extent of Measure Testing

The American Medical Association (AMA)-convened Physician Consortium for Performance Improvement (PCPI) collaborated on a measure testing project in 2011 with Telligen to ensure four radiology measures were reliable and evaluated for accuracy of the measure numerator, denominator, and exception case identification. The testing project was conducted utilizing electronic health record data and claims data. Inter-rater reliability was tested. Three sites in three states participated in the testing of the measures. All three sites were in urban settings. Site A was a group practice with 10 physicians. Site B was a hospital-based group practice with 90 physicians. Site C was a hospital-based practice with greater than 1000 physicians.

Reliability Testing

The purpose of reliability testing was to evaluate whether the measure definitions and specifications, as prepared by the PCPI, yield stable, consistent measures. Data abstracted from chart records were used to calculate inter-rater reliability for the measures.

Some of the measures in this set are being made available without any prior testing. The PCPI recognizes the importance of testing all of its measures and encourages testing of the diagnostic imaging measurement set for feasibility and reliability by organizations or individuals positioned to do so. The *Measure Testing Protocol for PCPI Measures* was approved by the PCPI in 2010 and is available on the PCPI Web site (see Position Papers at www.physicianconsortium.org); interested parties are encouraged to review this document and to contact PCPI staff. The PCPI will welcome any opportunity to promote the initial testing of these measures and to ensure that any results available from testing are used to refine the measures before implementation.

Evidence for Extent of Measure Testing

American College of Radiology (ACR), American Medical Association-convened Physician Consortium for Performance Improvement® (PCPI®), National Committee for Quality Assurance (NCQA). Diagnostic imaging performance measurement set. Reston (VA): American College of Radiology (ACR); 2015 Feb. 58 p. [89 references]

State of Use of the Measure

State of Use

Current routine use

Current Use

not defined yet

Application of the Measure in its Current Use

Measurement Setting

Ambulatory/Office-based Care

Ambulatory Procedure/Imaging Center

Hospital Inpatient

Hospital Outpatient

Long-term Care Facilities - Other

Skilled Nursing Facilities/Nursing Homes

Professionals Involved in Delivery of Health Services

not defined yet

Least Aggregated Level of Services Delivery Addressed

Individual Clinicians or Public Health Professionals

Statement of Acceptable Minimum Sample Size

Does not apply to this measure

Target Population Age

Unspecified

Target Population Gender

Either male or female

National Strategy for Quality Improvement in Health Care

National Quality Strategy Aim

Better Care

National Quality Strategy Priority

Health and Well-being of Communities

Institute of Medicine (IOM) National Health Care Quality Report Categories

IOM Care Need

Staying Healthy

IOM Domain

Effectiveness

Safety

Data Collection for the Measure

Case Finding Period

Unspecified

Denominator Sampling Frame

Patients associated with provider

Denominator (Index) Event or Characteristic

Diagnostic Evaluation

Therapeutic Intervention

Denominator Time Window

not defined yet

Denominator Inclusions/Exclusions

Inclusions

All final reports for procedures using fluoroscopy

Final Report: The final report of the fluoroscopy procedure or fluoroscopy guided procedure includes the final radiology report, definitive operative report, or other definitive procedure report that is communicated to the referring physician, primary care physician, followup care team, and/or maintained in the medical record of the performing physician outside the electronic health record (EHR) or other medical record of the facility in which the procedure is performed.

Exclusions

Unspecified

Exceptions

None

Exclusions/Exceptions

not defined yet

Numerator Inclusions/Exclusions

Inclusions

Final reports for procedures using fluoroscopy that include radiation exposure indices, or exposure time and number of fluorographic images (if radiation exposure indices are not available)

Note:

Radiation Exposure Indices: For the purposes of this measure, radiation exposure indices should, if possible, include at least one of the following:

- Skin dose mapping
- Peak skin dose (PSD)
- Reference air kerma ($K_{a,r}$)
- Kerma-area product (PKA)

If the fluoroscopic equipment does not automatically provide any of the above radiation exposure indices, exposure time and the number of fluorographic images taken during the procedure may be used.

Documentation: Information populating the final report may reside in a dedicated field in the electronic health record (EHR) or picture archiving and communication system (PACS), however fluoroscopy exposure dose or time should be included in the final report in order to be readily accessible in all circumstances

Image Count: Only images that require additional exposure to ionizing radiation, not those that are captured electronically from the imaging chain without additional exposure, should be counted.

Exclusions

Unspecified

Numerator Search Strategy

Fixed time period or point in time

Data Source

Administrative clinical data

Electronic health/medical record

Imaging data

Paper medical record

Registry data

Type of Health State

Does not apply to this measure

Instruments Used and/or Associated with the Measure

Unspecified

Computation of the Measure

Measure Specifies Disaggregation

Does not apply to this measure

Scoring

Rate/Proportion

Interpretation of Score

Desired value is a higher score

Allowance for Patient or Population Factors

not defined yet

Standard of Comparison

not defined yet

Identifying Information

Original Title

Measure #4: exposure reported for procedures using fluoroscopy.

Measure Collection Name

Diagnostic Imaging Performance Measurement Set

Submitter

American College of Radiology - Medical Specialty Society

Developer

American College of Radiology - Medical Specialty Society

National Committee for Quality Assurance - Health Care Accreditation Organization

Physician Consortium for Performance Improvement® - Clinical Specialty Collaboration

Funding Source(s)

Unspecified

Composition of the Group that Developed the Measure

Diagnostic Imaging Measure Development Work Group Members

William Golden, MD (*Co-chair*) (internal medicine)
David Seidenwurm (*Co-chair*) (diagnostic radiology)
Michael Bettmann, MD
Dorothy Bulas, MD (pediatric radiology)
Rubin I. Cohen, MD, FACP, FCCP, FCCM
Richard T. Griffey, MD, MPH (emergency medicine)
Eric J. Hohenwarter, MD (vascular interventional radiology)
Deborah Levine, MD, FACR (radiology/ultrasound)
Mark Morasch, MD (vascular surgery)
Paul Nagy, MD, PhD (radiology)
Mark R. Needham, MD, MBA (family medicine)
Hoang D. Nguyen (diagnostic radiology/payer representative)
Charles J. Prestigiacomo, MD, FACS (neurosurgery)
William G. Preston, MD, FAAN (neurology)
Robert Pyatt, Jr., MD (diagnostic radiology)
Robert Rosenberg, MD (diagnostic radiology)
David A. Rubin, MD (diagnostic radiology)
B Winfred (B.W.) Ruffner, MD, FACP (medical oncology)
Frank Rybicki, MD, PhD, FAHA (diagnostic radiology)
Cheryl A. Sadow, MD (radiology)
John Schneider, MD, PhD (internal medicine)
Gary Schultz, DC, DACR (chiropractic)
Paul R. Sierzenski, MD, RDMS (emergency medicine)
Michael Wasylik, MD (orthopedic surgery)

Diagnostic Imaging Measure Development Work Group Staff

American College of Radiology: Judy Burleson, MHSA; Alicia Blakey, MS

American Medical Association-convened Physician Consortium for Performance Improvement: Mark Antman, DDS, MBA; Kathleen Blake, MD, MPH; Kendra Hanley, MS; Toni Kaye, MPH; Marjorie Rallins, DPM; Kimberly Smuk, RHIA; Samantha Tierney, MPH; Stavros Tsipas, MA

National Committee for Quality Assurance: Mary Barton, MD

Financial Disclosures/Other Potential Conflicts of Interest

None of the members of the Diagnostic Imaging Work Group had any disqualifying material interest under the Physician Consortium for Performance Improvement (PCPI) Conflict of Interest Policy.

Measure Initiative(s)

Physician Quality Reporting System

Adaptation

This measure was not adapted from another source.

Date of Most Current Version in NQMC

2015 Feb

Measure Maintenance

This measure is reviewed and updated every 3 years.

Date of Next Anticipated Revision

2018

Measure Status

This is the current release of the measure.

This measure updates a previous version: American College of Radiology, Physician Consortium for Performance Improvement®, National Committee for Quality Assurance. Radiology physician performance measurement set. Chicago (IL): American Medical Association (AMA); 2010 Sep. 45 p.

Measure Availability

Source available from the [American College of Radiology \(ACR\) Web site](#) .

For more information, contact ACR at 1891 Preston White Drive, Reston, VA 20191; Phone: 703-648-8900; E-mail: info@acr.org; Web site: www.acr.org .

NQMC Status

This NQMC summary was completed by ECRI Institute on February 1, 2008. The information was verified by the measure developer on April 10, 2008.

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This NQMC summary was edited by ECRI Institute on April 27, 2012

Stewardship for this measure was transferred from the PCPI to the ACR. ACR informed NQMC that this measure was updated. This NQMC summary was updated again by ECRI Institute on October 13, 2015. The information was verified by the measure developer on November 19, 2015.

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Production

Source(s)

American College of Radiology (ACR), American Medical Association-convened Physician Consortium for

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